Kalispel Resident Fish Project

Kalispel Tribal Hatchery Operations and Maintenance

Annual Report
2002

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Kalispel Resident Fish Project

Kalispel Tribal Hatchery
Operations and Maintenance
2002 Annual Report

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Abstract

The Kalispel Tribal hatchery successfully spawned largemouth bass broodfish in spring 2002. Approximately 150,000 eggs were produced and hatched. These fry were started on brine shrimp for a period of ten days. At this time, the fry needed more abundance food supply. Cannibalism started and the hatchery staff transferred the remaining fry to the river in hopes that some fish would survive.

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Introduction

In 1987, the Northwest Power Planning Council (Council) amended its Columbia River Basin Fish and Wildlife Program (Program) to include a resident fish substitution policy. This policy called for substitution of resident fish in areas where anadromous fish historically occurred, but were blocked with the construction of the Chief Joseph and Grand Coulee Dams. One of the first projects adopted by the NPPC was the *Assessment of fishery improvement opportunities in the Pend Oreille River within the boundaries of the Kalispel Indian Reservation* (Ashe *et al*. 1991). The purpose of this three-year study was to establish baseline information of existing fish populations and habitat and identify possible methods of improving fisheries within Box Canyon Reservoir. Recommendations from this study are proposed as resident fish substitution under the Council's 1987 Resident Fish Substitution Policy. The assessment identified several factors within the reservoir that limited the fisheries opportunities, including water elevation fluctuations, lack of overwinter cover for age 0+ bass, and inadequate recruitment of largemouth bass *(Micropterus salmoide*s) into the system. The University of Idaho also performed a study during this time (Bennett and Liter 1991) and concurred with the above factors and proposed similar recommendations of the assessment study published by Ashe.

Ashe *et al.* (1991) indicated that growth rates of largemouth bass during the first four years in the Box Canyon Reservoir were lower than bass from other locations of the northern United States, and conversely, growth rates after the fourth year were comparable or even higher than other locations. The slower growth combined with a high rate of juvenile mortality associated with overwintering have reduced the potential for the bass population within the reservoir. Largemouth bass density estimates in the reservoir are approximately 6 pounds per surface acre.

In 1991, Ashe and Bennett suggested the possibility of an off-site rearing facility to supplement the number of juvenile largemouth bass within Box Canyon Reservoir. Supplemental stocking of yearling largemouth bass has been proven successful in other reservoirs. In Chatfield Reservoir, Colorado, largemouth bass were hatchery-reared to one year of age using intensive and extensive culture from 1978 to 1981. Subsequent samples of age 2 bass in the reservoir composed 12%, 59%, and 59% of the population, during sample years 1980, 1981 and 1982, respectively (Kreiger and Puttman 1986). Increases in the age 2 class fish were directly attributed to hatchery supplementation. Based on these findings, biological objectives for largemouth bass were identified and incorporated into the Council's Program. The largemouth bass biological objectives include:

- Increase the biomass of harvestable largemouth bass in Box Canyon reservoir from the current 6 pounds/acre to an interim target of 8 pounds/acre by 2003 and a final target of 12 pounds/acre by the year 2008.
- Increase age 0+ largemouth bass overwinter survival from current levels of 0.4-3.9 percent to approximately 15-20 percent.

Specific recommendations or strategies to attain these biological objectives were also formulated and presented to the Council for approval and funding. These recommendations include:

- Operate and maintain low-capital warm water hatchery constructed on the Kalispel Indian Reservation to produce 100,000 largemouth bass fry and 50,000 fingerlings for release into Box Canyon Reservoir.
- Construct, operate, and maintain water control structures on the Pend Oreille Wetlands Wildlife Project for the purpose of creating bass nursery sloughs.
- Construct, place, and maintain artificial cover structures to increase the amount of bass age 0+ fry winter cover in Box Canyon Reservoir. The purpose of the cover is to increase the overwinter survival of age 0+ largemouth bass.
- Monitor the effectiveness of largemouth bass supplementation.

The goals of this project are to facilitate the production and rearing of juvenile largemouth bass for supplementation and thereby increase the production of harvestable bass. The Annual Production Goal (APG) for the hatchery is to release 100,000 35mm fry and 50,000 140mm fingerlings into Box Canyon Reservoir.

Description of Project Area

The Pend Oreille River begins at the outlet of Lake Pend Oreille in Idaho and flows in a westerly direction to approximately Dalkena, Washington. From Dalkena, the river turns and flows north into British Columbia, where it eventually flows into the Columbia River. The approximate drainage area at the international border is 65,300 km^2 (Barber *et a*l. 1990). June is the normal high flow month with a mean discharge of 61,858 cfs, and August is the normal low flow month with a mean discharge of 11,897 cfs (Barber *et a*l. 1990). Box Canyon Reservoir has 47 tributaries and covers 90 river kilometers of the Pend Oreille River. The reservoir comprises the portion of the river between Albeni Falls and Box Canyon Dams. The Kalispel Tribal hatchery is located on the 436-acre Pend Oreille Wetlands Wildlife Mitigation Project, located on the Kalispel Indian Reservation. The project is situated on the east side of the Pend Oreille River, approximately nine miles north of Usk, WA.

Methods and Materials

Supplementation

All hatchery-reared largemouth bass are marked with a coded wire tag to distinguish them from the existing largemouth bass population. The location of the coded wire tag will be used to identify the size of fish at release. Three different outplanting locations have been identified: Rednours Slough, Dike Slough, and Campbell Slough (Figure 1). At this time, two separate sizes and dates have been identified for release.

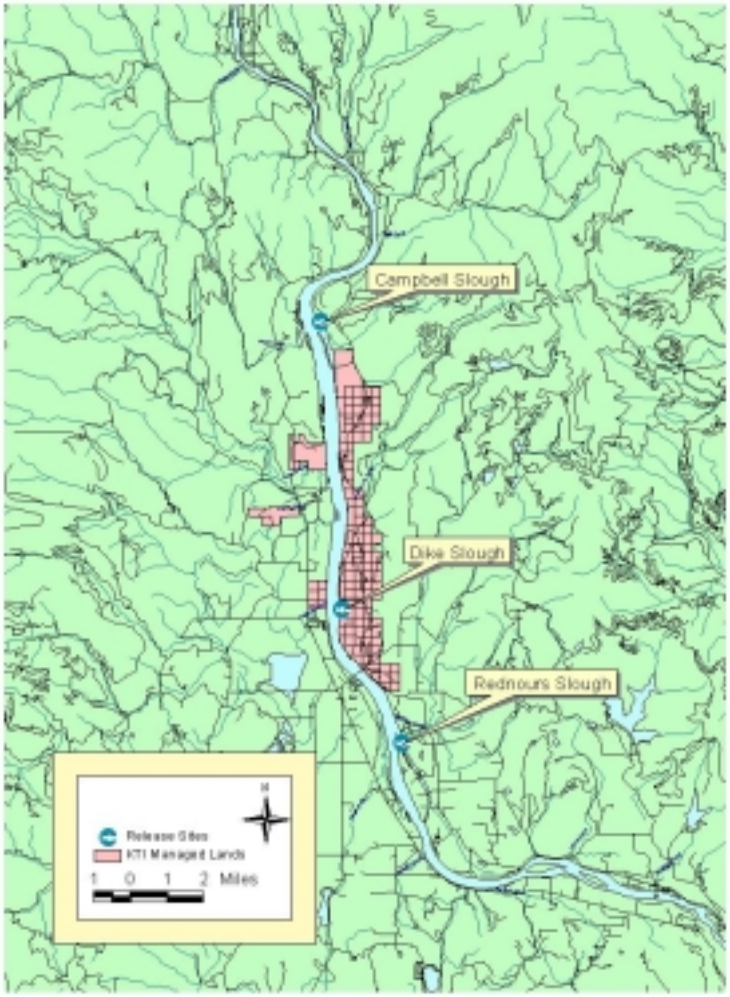

Figure 1. Outplanting locations, Usk, Washington

All outplanting locations will be sampled with a Smith-Root electro-shocking boat. For a more detailed description of the supplementation monitoring and evaluation efforts, refer to Appendix A.

Hatchery Operation

Raceway spawning of largemouth bass will be employed at the Kalispel Tribal hatchery. Raceway spawning of largemouth bass has been proven successful at the Jake Wolf Hatchery, San Marcos, Texas and other largemouth bass hatcheries (Tom Hays, Jack Wolf Hatchery, personal communication, 1995). This technique allows the hatchery manager and staff to easily observe the brood fish and determine the extent to which successful spawning is taking place. The use of artificial spawning nests will enable the hatchery staff to transport the fertilized eggs from the raceway to the hatchery troughs for intensive rearing. This reduces the number of brood fish required for achieving the APGs for the hatchery.

The hatchery will have 14-18 pairs of brood fish that will produce all of the hatchery-reared fry. These brood fish will be acclimated in the hatchery for at least 10-12 months prior to the spawn. Once acclimated, these brood fish should be ready to perform all of the spawning activities. In the spring, the brood fish will be closely monitored while the water temperature is slowly increased. Once the water temperature in the raceway is a steady 68°F and the brood fish appear ready to spawn, 16 artificial spawning nests will be placed in the raceway. Brood fish requirements are determined based on a need of 150,000 35 mm fry and assuming 67% survival.

The three rearing ponds will be filled and fertilized to enhance the natural phytoplankton blooms. The phytoplankton blooms provide a vegetative food source for zooplankton upon which the newly hatched fry will feed. During each of the spawning periods, the artificial nests with eggs are allowed to remain in the raceway for 1-2 days before being transferred to the incubation troughs, after which the nests with fertilized eggs will be treated with a 250 mg/l formalin bath treatment to disinfect the eggs. Treatments will continue until the eggs hatch (generally 2-3 days). Each trough can be partitioned-off to hold fish that are more than 2 days apart. This reduces the size disparity and any losses due to cannibalism. After 5-7 days in the troughs, the eggs hatch and the fry begin to appear along the bottom of the trough. The fry will remain in the troughs for an additional 7-10 days until they “swim up” in search of food. At this time, the fry will be enumerated and transported to the rearing sloughs for grow out. The largemouth bass fry will remain in the fertilized sloughs until most of the zooplankton is consumed and/or they are large enough to collect (6-8 weeks).

The fry will be collected and transferred to the hatchery for marking. Once marked, the fry will be transported to the predetermined release site. Approximately 50,000 bass fry will be retained in the hatchery and trained on artificial feed. These fish will be raised in the hatchery at an initial density of 0.25 lb./ft.^{3}, and trained to receive artificial feed until they achieve a density of up to 1.0 lb./ft.^{3}. At this maximum density, the four indoor troughs (86 ft.^{3} each) can accommodate up to 45,000 65mm fingerlings (assuming 90% survival), and the raceway can accommodate up to 100,000 75mm fingerlings. These fingerling-sized fish will be marked in the cheek and released in the late summer. The three newly constructed rearing ponds will be used to hold and raise the newly hatched fry. The ponds are equipped with a concrete kettle for easy removal of the fry. The ponds are also lined, have predator netting, and are each equipped with power hook-ups to run the aerators. In the past, insufficient rearing space has been the major limiting factor as to why the hatchery staff was not able to hold and feed the fry up to a taggable size.

Monitoring and Evaluation

Supplementation

Monitoring and evaluation of supplementation efforts will be conducted by electro-shocking at the outplanting locations following release to estimate the survivability of hatchery-raised largemouth bass. The hatchery staff will also conduct creel surveys, mainly during bass tournaments. This will provide the staff with baseline data to help determine the success of hatchery-raised bass. All hatchery-raised largemouth bass will be marked with a coded wire tag. The location of the coded wire tag will identify the size of the fish at the time of release (fry or fingerling). Strategies on the most effective release size will then be formulated to best accomplish the APGs. For a more detailed

description of the supplementation monitoring and evaluation efforts, refer to Appendix A.

Hatchery Operation

To ensure efficiency, the hatchery staff will closely monitor all aspects of the hatchery operation. Physical and biological factors will be monitored at the hatchery and are derived from Piper *et al.* (1992):

Physical

- Volume of water ($ft.^3$) used in each trough during hatchery operations (incubation, rearing).
- Amount of water flow (gallons/minute) into each trough during hatchery operations.
- Water temperature

Biological

- Percent survivability from egg to fry.
- Food and Diet
  - Cost/pound for fish feed.
  - Relationship (conversion) between the amounts of feed to the amount of actual growth/fish.
- Fish
  - Amount of brood fish and number of eggs produced/fish.
  - Amount and weight of fry hatched during spawn (troughs).
  - Amount and weight of fry planted into rearing sloughs.
  - Amount of fry transported from rearing ponds to outplanting location.
  - Weight gain/loss of brood fish (pre-spawn and post-spawn).
  - Date eggs fertilized, hatched, transferred to ponds, and outplanted.
  - First feeding of fry.
- Disease
  - Occurrence, kind, and possible contributing factors.

Rearing Ponds

Physical

- Volume (acre-feet), average depth of slough.
- Amount of inflow required to maintain water level in ponds.
- Average water temperature.
- Fertilization date, type, amount, cost, and results.
- Amount of phytoplankton blooms and zooplankton estimates (dates of bloom, types of plankton and zooplankton).

Biological

- Percent survivability from fry to fingerling.

- Food and Diet
  - Cost per pound of feed and cost per pound of fish gained.
  - Amount of food fed as percentage of fish body weight.
  - Pounds of food fed per pound of fish produced (conversion).
- Fish
  - Gain in weight.
  - Average length and weight before release into sloughs.
- Disease
  - Occurrence, kind, and possible contributing factors

Results and Discussion

The spawning season got under way July 16, 2002 with the first mats having eggs on them. The water temperature was a steady 68°F for 7-10 days. This has been very consistent with the past two years. Out of the fifteen spawning mats that were placed into the raceway, eight of them were used for spawning. The staff estimated that 150,000 out of the 200,000 eggs were successfully hatched. These fish were started on brine shrimp immediately after "swim-up". As in the past two years, this was a sufficient food source for the first 7-10 days. Cannibalism was the main factor for fish loss. The fish loss was approximately half of the 150,000 fry. The staff released the remaining fry into the river. The rearing ponds will facilitate the Tribe's ability to rear the bass to a tagable size for release into the river.

Summary and Conclusions

The Tribe has been successful in producing adequate largemouth bass eggs to meet the APGs. However, the limiting factor of producing tagable fish and releasing them into the river has been a lack of rearing space. In the past two years, the Tribe has not had a single fish mortality, which has been a major problem in the past.

2003 Objectives

Objective 1. Develop egg collection, spawning, and incubation techniques and procedures for producing largemouth bass.

The brood fish spawning techniques and egg collection/incubation techniques have been developed. These activities are described in the Method and Materials section of this document. No APGs were achieved during the year.

Objective 2. Develop and describe fry and fingerling rearing methods to meet 2003 APGs.

Fry rearing strategies have been formulated and are documented in the Methods and Materials section of this document. These production procedures are described but not tested. The Tribe expects to fine-tune these procedures once production commences.

Objective 3. Mark all hatchery-raised largemouth bass for outplanting into Box Canyon Reservoir.

All hatchery-reared largemouth bass will be marked with a coded wire tag to distinguish them from the native largemouth bass population. Location of the coded wire tag will used to identify the size of fish at release. Two separate sizes and dates have been identified for release. All outplanting locations will be sampled with a Smith-Root electro-shocking boat. Creel surveys will be conducted during bass tournaments to help monitor effectiveness. The marking operation has been developed but not tested. Once production activities begin, the Tribe expect these procedures to be fine-tuned.

Objective 4. Monitor effectiveness of hatchery supplementation. Complies with the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program under section 10.8B.19.

A Kalispel Tribal Bass Hatchery Supplementation Plan has been prepared and is included in Appendix A.

Objective 5. Prepare and submit final report for fiscal year 2003.

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Appendix A:

Kalispel Tribal Hatchery Largemouth Bass Supplementation Study

KALISPEL TRIBAL HATCHERY

LARGEMOUTH BASS

SUPPLEMENTATION STUDY

INTRODUCTION

In 1987, the Northwest Power Planning Council (Council) amended its Columbia River Basin Fish and Wildlife Program (Program) to include a resident fish substitution policy. This policy called for substitution of resident fish in areas where anadromous fish historically occurred, but were blocked with the construction of the Chief Joseph and Grand Coulee Dams. One of the first projects adopted by the Council was the *Assessment of fishery improvement opportunities in the Pend Oreille river within the boundaries of the Kalispel Indian Reservation* (Ashe *et al.* 1992). The purpose of this three-year study was to establish baseline information of existing fish populations and habitat; and identify possible methods of improving fisheries within the reservoir. Recommendations from this study are proposed as resident fish substitution under the Council's 1987 Resident Fish Substitution Policy.

The assessment identified several factors within Box Canyon Reservoir that limited the fisheries opportunities. Some of these factors include water elevation fluctuations, lack of overwinter cover for age 0+ bass, and inadequate recruitment of largemouth bass into the system. The University of Idaho also performed a study in within this timeline (Bennett and Liter),concurred with the study findings, and proposed similar recommendations of the assessment study published by Ashe.

Based on these findings, biological objectives for largemouth bass (*Micropterus salmoides*), bull trout (*Salvelinus confluentus*), and cutthroat trout (*Oncorhynchus clarki*) were identified and incorporated into the Council's Program. The largemouth bass biological objectives include:

- Increase the biomass of harvestable largemouth bass in Box Canyon Reservoir from the current 6 pounds/acre to an interim target of 8 pounds/acre by 2003 and a final target of 12 pounds/acre by the year 2008.
- Increase age 0+ largemouth bass overwinter survival from current levels of 0.4-3.9 percent to approximately 15-20 percent.

Specific recommendations or strategies to attain these biological objectives were also formulated and presented to the Council for approval and funding. These recommendations include:

- Operate and maintain low-capital warm water hatchery constructed on the Kalispel Indian Reservation to produce 100,000 largemouth bass fry and 50,000 fingerlings for release into Box Canyon Reservoir.
- Construct, operate, and maintain water control structures on the Pend Oreille Wetlands Wildlife Project for the purpose of creating bass nursery sloughs.

- Construct, place, and maintain artificial cover structures to increase the amount of bass age 0+ fry winter cover in Box Canyon Reservoir. The purpose of the cover is to increase the overwinter survival of age 0+ largemouth bass.
- Monitor effectiveness of largemouth bass supplementation.

The main objective for this study is to test the survivability of hatchery-raised bass through their first year following planting. Expected interpretations include strategies for release size and outplanting locations.

METHODS AND MATERIALS

All hatchery-raised largemouth bass released into the reservoir will be marked with a coded-wire tag. The location of the tag will identify the particular release-size. All supplementation efforts shall be performed within a 20-30 mile reach of the 57-mile long Box Canyon Reservoir. Specific outplanting locations will focus on areas that currently support a viable largemouth bass population. Table 1 includes a list of the outplanting locations and fish stocking sizes.

Table 1. Outplanting locations and release numbers.

Outplanting Location	Fry	Fingerling	Fingerling 1+	Totals
Rednours Slough	33,333	15,000	1,667	50,000
Dike Slough	33,333	15,000	1,667	50,000
Campbell Slough	33,334	15,000	1,666	50,000
Totals	100,000	45,000	5,000	150,000

Three different fish sizes will be released at each location. The first stocking will take place in early summer and will consist of approximately 100,000 fry (~55mm). The second stocking will take place in early fall and consist of approximately 45,000 fingerlings (~125mm). A third stocking will take place the following spring with approximately 5,000 fingerlings age 1+. Each group of fish will have its own distinctive mark that will indicate the specific release size.

Recapture rates of the different release sizes will be tested for significance using the Chi^2 test of significance (distribution). All hatchery-released fish recaptured during the study will be re-marked and released into the reservoir. The mark-recapture numbers will then be totaled for the entire sampling period (March-October).

$$Chi^2 = \frac{(Observed - Expected)^2}{Expected}$$

Each outplanting location will be sampled monthly (March-October) following release. Three ten-minute transects will be performed at each release site. Two transects shall be located on opposite banks within the slough and another located immediately downstream of the slough in the main channel. All areas will be sampled with a Smith-Root electro-shocking boat. Only largemouth bass will be sampled. A catch per unit effort (CPUE) will be calculated for each transect and release area.

$$CPUE = \frac{\text{Sample time}}{\text{Fish sampled}}$$

A Jolly-Seber model will be used to generate survival estimates for the hatchery-raised fish. The data gathered during the study will be entered into a computer-based program entitled “MARK”. This program utilizes a Jolly-Seber model to generate survival estimates. The survival rates between hatchery-raised bass and the native population will be compared, along with different survival rates between release sizes.

The plot-level calls for each sampling area include:

1. Study name
2. Date
3. Time of day
4. Transect name and number
5. River elevations at Box Canyon, Albeni Falls, and Cusick
6. Water temperature
7. Crew initials

Only largemouth bass will be sampled within each transect. The specific measurements for each fish include:

1. Species
2. Total length (mm)
3. Total weight (grams)
4. Sex (if possible)
5. Other identifying marks

NULL HYPOTHESIS

H_o : Survival release size 1 = Survival release size 2 = Survival release size 3

ALTERNATIVE HYPOTHESES

H_1: Survival release size 1 > Survival release size 2

H_2: Survival release size 2 > Survival release size 1

H_3: Survival release size 1 > Survival release size 3

H_4: Survival release size 3 > Survival release size 1

H_5: Survival release size 2 > Survival release size 3

H_6: Survival release size 3 > Survival release size 2

Release size 1 = Fry age 0+ (approximately 100,000 released)

Release size 2 = Fingerling age 0+ (approximately 45,000 released)

Release size 3 = Fingerling age 1+ (approximately 5,000 released)

EXPECTED INTERPRETATIONS

Increased survivability of hatchery-raised fish within the reservoir shall be the most important variable considered when deciding which stocking size best satisfies the biological objective of increasing the biomass of harvestable bass. Another factor involved in the decision criteria is the overall cost associated with each release size. Generally, the smaller the fish at the time of release, the lower the cost.

Null Hypothesis (survival 1 = survival 2 = survival 3)
- TRUE: If all three release sizes exhibit the same types of survival, then the most cost effective method of release will be employed.
- FALSE: Go through alternative hypothesis key.

Alternative Hypothesis 1 (survival 1 > survival 2)
- TRUE: If release size 1 is more cost effective, then release size 1 will be employed. Note finding and go to hypothesis 3.
- FALSE: Reject hypothesis, note finding, and go to hypothesis 2.

Alternative Hypothesis 2 (survival 2 > survival 1)
- TRUE: If release size 2 is more cost effective, then release size 2 will be employed. Note findings and go to hypothesis 3.
- FALSE: Reject hypothesis, note finding, and go to hypothesis 3.

Alternative Hypothesis 3 (survival 1 > survival 3)
- TRUE: If release size 1 is more cost effective, then release size 1 will be employed. Note finding and go to hypothesis 5.
- FALSE: Reject hypothesis, note finding, and go to hypothesis 4.

Alternative Hypothesis 4 (survival 3 > survival 1)
- TRUE: If release size 3 is more cost effective, then release size 1 will be employed. Note finding and go to hypothesis 5.
- FALSE: Reject hypothesis, note finding, and go to hypothesis 5.

Alternative Hypothesis 5 (survival 2 > survival 3)
- TRUE: If release size 2 is more cost effective, then release size 2 will be employed. Note finding and go to hypothesis 6.
- FALSE: Reject hypothesis, note finding, and go to hypothesis 6.

Alternative Hypothesis 6 (survival 3 > survival 2)
- TRUE: If release size 3 is more cost effective, then release size 3 will be employed. Note finding.
- FALSE: Reject hypothesis and note finding.

Appendix B:

Kalispel Tribal Hatchery Production Procedures Handbook

Kalispel Tribal Hatchery

Production Procedures

Handbook

Prepared by:

JR Bluff
Hatchery Manager

Updated
September 18, 2000

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Introduction

This handbook is intended to give detailed steps for the production of largemouth bass raised at the Kalispel Tribal hatchery. The major components for the hatchery operation include two rearing sloughs, raceway spawning, egg incubation, fry transfer, fry harvest, tagging operation, and brood fish collection and handling. This document is intended to list the procedures involved in the production of fry and fingerlings for outplanting. The specific procedures for operating all of the mechanical pumps are contained in the Operations and Maintenance Manual.

Rearing Pond Fertilization

1. The ponds should begin preparation 7 days prior to the spawn. This should give you about 3-4 weeks for phytoplankton/zooplankton growth before the fry arrive.
2. The initial application of organic fertilizer is at 150 lbs./acre (alfalfa meal) and inorganic fertilizer (16-20-0) at 8 lbs/acre. Add approximately 100 pounds of organic fertilizer and about 5 pounds of inorganic to each pond.
3. The second application should be applied in two days at the same rate as the initial application.
4. After these two applications, decrease the amount to 50 pounds of inorganic fertilizer per pond. Apply the same amount inorganic fertilizer.
5. Application rates should remain at 50 lbs. until the fry are ready for planting. Fertilize every 3 days after the first two applications.

Raceway Spawning

Spawning activities should take place as soon as the river water temperature reaches 65°F. No water will need to be heated. Once the river water warms up, the bass will spawn (this should be May or June). There shall be minimal contact with hatchery personnel or visitors as it is our most critical time of year.

Once the first spawn is noticed, the brood fish will be allowed to spawn for an additional 14 days. Each nest will be visually inspected for the presence of a male protecting the fertilized nest. The female may not lay her eggs until dawn or dusk. Once eggs are noticed on the nests, the nest will remain in the raceway for another day while the male protects it from predators.

Once the nest has eggs on it, the nest will be removed from the raceway and placed in the hatchery. Hatchery staff will raise the nest from the bottom of the raceway and gently slide a galvanized washtub underneath it, lifting the nest out of the raceway. The area in which the nest was located will be swept with a fine mesh net to pick up any loose eggs that may have fallen. These eggs shall be placed in the galvanized washtub with the nest. This will minimize the amount of hatched fry swimming around in the raceway.

Egg Incubation

The nest will be immediately transferred to the hatchery building and placed into an incubation trough. All spawns will be treated with formalin at 250 mg/l for 60 minutes. Treatment will continue until the eggs hatch (2-3 days). Once the eggs hatch, all formalin treatments will stop. The nests will be held vertically in the troughs so that the water flows through the nests. Each trough can hold 7-10 nests that are no more than 3 days apart.

Following the hatch, the nests will remain in the troughs for 7-10 days until the fry swim up. You will see the fry at the bottom of the tank when they hatch. Once the fry swim up, they are ready to be moved to the sloughs. The “swim up” means that the fry are looking for food. Before the fry are to be moved to the sloughs, they first must be counted. The displacement technique can be used to estimate the numbers of fry. Place the fry into the beaker until the water level is displaced 1000 ml. In time, we will know the fry/ml conversion. In Colorado, they estimated 275 fry/1000 ml water displaced.

Fry Transfer to Rearing Ponds

After being weighed and estimated, the fry will be transferred to the ponds using the 20-gallon galvanized washtubs. The water temperature, Ph, and DO need to be carefully monitored so we do not put too much stress on the fry. The trough water will need to be slowly converted to fresh river water to better acclimate the fry to their new environment.

Once the fry have arrived at the ponds, lower the washtub into the water. Slowly tip the tub so that the river water gently mixes into the tub. This should take about 3-5 minutes. Closely observe the fry to see how they respond. After 3-5 minutes, the fry should be swimming away. Let them swim away at their own pace. Note the amount of fry and the date on which you released them. They should be fine for 3-4 weeks. The fry will drastically increase in size within this 3-4 week period.

Harvest of Fry from Rearing Ponds

After the fry have been in the ponds for 4-6 weeks, it is time to remove them and ship them out to the identified outplanting location. The 4-6 week time frame reflects the amount of time it will take the fry to eat all of the zooplankton within the ponds. After this the fry may begin to cannibalize each other.

Tagging Operations

The Kalispel Tribal hatchery is responsible for marking all hatchery-raised fish before outplanting into Box Canyon Reservoir. We have decided to use coded-wire tags for all of the fish. The first year we will tag all fish with “Agency Only” tags and later we will use tags that can identify the fish as being raised in that particular year. We plan to mark the first 100,000 fry in the nape.

The other 50,000 fry will be held for 1-2 months in the hatchery, where they will reach fingerling-size. Prior to release, these fish will be tagged with the coded-wire tag in the

cheek. These two separate locations should enable the hatchery staff to differentiate between release size strategies.

The actual tagging operation has not been performed as of yet. Once tagging operations commence, we will be able to detail the necessary steps involved in this task.

Broodfish Gathering/Handling

The collection of brood fish for spawning activities needs to be an annual event. Following spawning, the brood fish need to be checked for injuries. If they are injured, they should be released back into the reservoir to live out the rest of their lives. This section will detail the appropriate safety measures needed when collecting brood fish for the hatchery.

Brood fish collection will be performed with the shocking boat. There needs to be at least 5 people involved in this operation in order to lessen the stress to the fish. Once on the water, salt can be added to the live well at a .3% concentration to calm the fish down while in the boat. The live well holds approximately 94 gallons so about 4 cups (2 lbs.) of salt should be added. When transferring the fish to the hatchery, the same concentration can be used for the transfer tanks.

When selecting a site to gather brood fish, pick one that is accessible by a truck to allow for easy transfer from the boat to the truck. Once shocking has begun and you have netted the first fish, try to have the fish in the hatchery within 30 minutes. Allow 5 minutes for shocking, 5 minutes for transferring to the truck, and 20 minutes for hauling to the hatchery. The fish cannot be over crowded during the transfer to the hatchery. Depending on the size of the tanks being used for transfer, 5-8 fish will be best.

Once the fish have arrived at the hatchery, they can be held in the raceway for 1 day. This will give them some time to get acclimated to their new surroundings. The next day the brood fish need to be started on a formalin treatment schedule to kill external parasites. We have used a 1:10,000 mixture for the brood fish, and this seems to be sufficient. This bath needs to be administered every other day for at least 2 weeks. Treatment with formalin will be needed for the brood fish for their entire life in the hatchery.

Egg Disinfectant

Once the brood fish have fertilized the eggs, we need to remove them to the hatchery troughs for incubation. All spawns need to be treated with a 250 ppm formalin bath for 1 hour. This treatment must be administered each day until they hatch.

1. Determine the volume of the trough. (Length x Width x depth). Make sure you convert the inches into a decimal. This answer will be cubic feet.
2. Once you have the volume of water, convert this number into an easier to measure form. Lets convert the cubic feet of water to liters. (The conversion is 28.32 liters = 1 cubic foot).
3. Now we need to calculate the amount of liters of formalin to add. The recommended dosage is 250 ppm. This is also shown as 250 mg/l and .025% treatment levels. We will use the .025% number. All we need to do is show the percentage as a decimal (.025 / 100) this comes out to be .00025. Multiply this number by the total amount of water in the trough (liters). This is the amount of formalin you need to add to the trough.

Example:

1. Trough volume

Height	18.5 inches	= 1.54 ft.
Width	29.0 inches	= 2.42 ft.
Length		= 24.00 ft
L x W x H		= 89.4 cubic ft.

2. Convert this to liters of water.

89.4 cubic ft. x 28.32 liters/cubic foot = 2,532 liters of water.

3. Recommended dosage (250 ppm or .025%). All we need to do is to convert the percentage into a decimal (divide .025 by 100) = .00025. Multiply this number by the volume of water in the trough to get (2,532 x .00025) the amount of formalin to add. Answer: .633 liters.

Literature Cited

Ashe, B.L., and A.T. Scholz. 1992. Assessment of the fishery improvement opportunities on the Pend Oreille River. U.S. Bureau of Reclamation. Contact No. WPRS-0-07-10-0216; FWS-14-06-009-904, May 1985. 168 pp.

Certification Language and Signature of Responsible Party

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by: _____ Date: _____

David Nenema, Hatchery Manager
Kalispel Tribe Natural Resource Dept.